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BUCHANAN INGERSOLL PC
(INCLUDING BURNS, DOANE, SWECKER & MATHIS)
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EXAMINER

HOFFBERG, ROBERT JOSEPH

ART UNIT

PAPER NUMBER

2835

DATE MAILED: 11/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Detailed Action

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "20" and "30" have both been used to designate electronic component (Para 0022, line 8). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Shin et al. (US 6,275,374).

With respect to Claim 1, Shin et al. teaches a heat-dissipation device for dissipating heat produced by at least one electronic component (Fig. 1, #24) of an

electronic control device, wherein the electronic control device includes a circuit board (Fig. 1, #30) having the electronic component mounted thereon, and a protective case (Fig. 1, #84) substantially confining the circuit board, the heat dissipation device comprising: a heat conductive terminal (Fig. 1, #40) connected to the circuit board in a position proximate to the electronic component, so that the heat (Col. 6, lines 44-45) of the electronic component is transferred or conducted to the heat conductive terminal; wherein the heat conductive terminal contacts (Col. 6, lines 45-46) the protective case in order to thermally conduct the heat to the protective case.

With respect to Claim 2, Shin et al. further teaches a heat-dissipating device wherein the heat conductive terminal (Fig. 1, #45) further comprises; a first end portion (Fig. 1, #42 bottom) connected to the protective case, and a second end portion (Fig. 1, #42 middle) inserted into an insertion hole formed in the circuit board so as to be connected to an inner wall of the insertion hole.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 3-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (US 6,275,374) as applied to claims above, and further in view of Brown (US 4,729,061).

With respect to Claim 3, Shin et al. teaches a heat-dissipating device as in claims above. Shin et al. does not describe the construction and vias of the circuit board.

Brown teaches a first heat conductive layer (Fig. 1, #42) formed on the inner wall of the insertion hole, and at least one second heat conductive layer (Fig. 1, #12) disposed on or within the circuit board and connected to the first heat conductive layer, so that the heat conducted or transmitted from the electronic component to the at least one second heat conductive layer is further conducted to the heat conductive terminal (Fig. 1, #44). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. with that of Brown for the purpose of providing a means of thermally conducting between the circuit board and the terminal.

With respect to Claim 4, Shin et al. does not teach that the second end portion of the heat conductive terminal is connected to the first heat conductive layer by a soldered portion. Brown further teaches wherein the second end portion of the heat conductive terminal is connected to the first heat conductive layer by a soldered (Col. 1, line 47) portion. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. with that of Brown by using solder as a means to couple the circuit board and the terminal.

With respect to Claim 5, Shin et al. does not teach heat conductive layers on a top surface, the intermediate region and bottom surface of the circuit board. Brown further teaches wherein the at least one second heat conductive layer includes a top (Fig. 10, #112) heat conductive layer, at least one intermediate (Fig. 10, #132) heat

conductive layer, and a bottom (Fig. 10, #134) heat conductive layer, that are disposed on a top surface, an intermediate region (Fig. 10, #130), and a bottom surface (Fig. 10, #136) of the circuit board, respectively. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. with that of Brown by using multiple heat conductor layers to increase the thermal dissipation.

With respect to Claim 6, Shin et al. does not teach a first electrical layer and a plurality of second electrically conductive layers on the top surface, the intermediate region and bottom surface of the circuit board. Brown further teaches wherein the circuit board further having at least one through hole (Fig. 10, #160) formed in the circuit board extending throughout the thickness of the circuit board and disposed in close proximity (see Fig. 10) to the electronic component, additionally includes: a first electrical conductive layer (Fig. 1, #160 and Col. 2, lines 17-22) formed on an inner wall of the through-hole (Fig. 4, #203); and a plurality of second electrically conductive layers including a top (Fig. 10, #112 and Col. 4, line 68 layer can be both electrical and thermal) electrically conductive layer, at least one intermediate (Fig. 10, #132 and Col. 4, line 68 layer can be both electrical and thermal) electrically conductive layer, and a bottom (Fig. 10, #134 and Col. 4, line 68 layer can be both electrical and thermal) electrically conductive layer that are disposed on a top surface, an intermediate region (Fig. 10, #130), and a bottom surface (Fig. 10, #136) of the circuit board, respectively, wherein at least two of the second electrical conductive layers are connected (see Fig. 10) to each other via the first electrically conductive layer. It would have been obvious

Art Unit: 2835

to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. with that of Brown to couple multiple heat conductor layers to the heat pipe in the through hole to increase the thermal dissipation.

With respect to Claim 7, Shin et al. does not teach that the top, intermediate and bottom electrically conductive layers are connected. Brown further teaches wherein the top (Fig. 10, #112) electrically conductive layer is connected to at least one of the intermediate (Fig. 10, #132) electrically conductive layer and the bottom (Fig. 10, #134) electrically conductive layer, so that the heat (Col. 3, line 3) produced by the electronic component is conducted (see Fig. 7 and Col. 7, line 48) to the top electrically conductive layer and then to the at least one of the intermediate electrically conductive layer and to the bottom electrically conductive layer, via the first electrically conductive layer (Fig. 1, #160 and Col. 2, lines 17-22). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. with that of Brown to couple multiple heat conductor layers to the heat pipe in the through hole to increase the thermal dissipation.

5. Claims 8-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (US 6,275,374) and Brown (US 4,729,061) as applied to claims above, and further in view of Roessler et al. (US 6,212,071).

With respect to Claims 8, 10 and 12, Shin et al. in view of Brown teach a heat-dissipating device as in claims above. Shin et al. in view of Brown do not teach the material and manufacturing sequence of the heat and electrically conductive layers. Roessler et al. teaches wherein the top, intermediate and lower heat conductive layers

Art Unit: 2835

and the top, intermediate and lower electrically conductive layers, respectively, are made of the same material (Col. 2, lines 38-39) and are formed simultaneously (Col. 2, lines 39-41) with each other. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. and Brown with that further of Roessler et al. to reduce costs by using the same material and at same manufacturing operation.

With respect to Claim 9, 11 and 13, Shin et al. in view of Brown do not teach each heat and electrical conductive layer have regions that are electrically separated from each other. Roessler et al. further teaches wherein the top, intermediate and lower heat conductive layers and the top, intermediate and lower electrically conductive layers, respectively, are separated (Col. 2, lines 36-38) from each other electrically.

6. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (US 6,275,374) as applied to claim 1 above, and in view of Roessler et al. (US 6,212,071).

With respect to Claim 14, Shin et al. teaches a heat-dissipating device as in claim 1, wherein the protective case (Fig. 2, #80) includes a case body (Fig. 2, #84) and a case cover (Fig. 2, #82) and the circuit board (Fig. 2, #30) is mounted to and within the case body. Shin et al. does not describe case material. Roessler et al. teaches wherein the protective case is made of metal (Col. 2, line 61). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. with that of Roessler et al. to use a metal as a

Art Unit: 2835

good heat conductive material to dissipate heat away from the electrical components to the outside environment.

With respect to Claim 15, Shine et al. does not teach an electronic control device comprising the heat-dissipating device. Roessler et al. further teaches an electronic control device (Fig. 1, #20) comprising the heat-dissipating (Col. 2, lines 33-34) device. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. with that of Roessler et al. that the heat-dissipating device could be an electronic control device or any device that is in need to be cooled.

7. Claim 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (US 6,212,071) in view of Brown (US 4,729,061) as applied to claims above, and further in view of Chobot et al. (US 5,363,280).

With respect to Claim 16, Shin et al. in view of Brown teach a heat-dissipating device as in claims above. They do not describe the heat conductive terminal in detail. Chobot et al. teaches wherein the second end portion further includes; a first protrusion contacting a top surface (Col. 7 lines 9-10 and Fig. 9, top near #26) of the circuit board, a second protrusion contacting a bottom surface (Fig. 8, #21) of the circuit board, and wherein the heat conductive terminal (Fig. 8, #19) is fixed in position relative to the insertion hole (col. 7, line 6) via the first and second protrusions, and wherein the second end portion directly contacts the first heat conductive layer (Fig. 10, #25 on bottom). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. and Brown with

Art Unit: 2835

that further of Chobot et al. to use solder as the protrusion to insure a good heat conductive path between the terminal and the heat conductive layer.

With respect to Claim 17, Shin et al. in view of Brown do not teach a second heat conductive layer. Brown further teaches wherein the at least one second heat conductive layer includes a top (Fig. 10, #112) heat conductive layer, at least one intermediate (Fig. 10, #132) heat conductive layer, and a bottom (Fig. 10, #134) heat conductive layer, that are disposed on a top surface, an intermediate region, and a bottom surface of the circuit board, respectively. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. with that of Brown to couple multiple heat conductor layers to increase the thermal dissipation.

With respect to Claim 18, Shin et al. in view of Brown do not teach a circuit board having a through hole in close proximity of the electrical device. Brown further teaches wherein the circuit board further having at least one through hole (Fig. 10, #160) formed in the circuit board (Fig. 10, #100) extending throughout the thickness of the circuit board and disposed in close proximity to the electronic component (Fig. 10, #154), additionally includes: a first electrical conductive layer formed on an inner wall (Fig. 10, #160) of the through-hole; and a plurality of second electrically conductive layers including a top (Fig. 10, #112 and Col. 4, line 68 layer can be both electrical and thermal) electrically conductive layer, at least one intermediate (Fig. 10, #132 and Col. 4, line 68 layer can be both electrical and thermal) electrically conductive layer, and a bottom (Fig. 10, #134 and Col. 4, line 68 layer can be both electrical and thermal)

electrically conductive layer that are disposed on a top surface, an intermediate region (Fig. 10, #130), and a bottom (Fig. 10, #130) surface of the circuit board, respectively, wherein at least two (see Fig. 10) of the second electrical conductive layers are connected to each other via the first electrically conductive layer. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. with that of Brown to couple multiple heat conductor layers to increase the thermal dissipation.

With respect to Claim 19, Shin et al. in view of Brown do not teach that electrically conductive layers are connected. Brown further teaches wherein the top (Fig. 10, #112) electrically conductive layer is connected to at least one of the intermediate (Fig. 10, #132) electrically conductive layer and the bottom (Fig. 10, #134) electrically conductive layer, so that the heat (Col. 3, line 3) produced by the electronic component is conducted (see Fig. 7 and Col. 7, line 48) to the top electrically conductive layer and then to the at least one of the intermediate electrically conductive layer and to the bottom electrically conductive layer, via the first (Fig. 10, #160) electrically conductive layer. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. with that of Brown to couple multiple heat conductor layers to increase the thermal dissipation.

8. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (US 6,275,374), in view of Brown (US 4,729,061), in further view of Chobot et al. (US

5,363,280) as applied to the claims above, and further in view of Roessler et al. (US 6,212,071).

With respect to Claim 20, Shin et al. in view of Brown in further view of Chobot et al. teach a heat-dissipating device as in claims above, wherein the protective case (Shin et al. Fig. 2, #80) includes a case body (Shin et al. Fig. 2, #84) and a case cover (Shin et al. Fig. 2, #82) and the circuit board (Shin et al. Fig. 2, #30) is mounted to and within the case body. Shin et al. in view of Brown in further view of Chobot et al. do not describe case material. Roessler et al. teaches wherein the protective case is made of metal (Col. 2, line 61). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. with that of Roessler et al. to use a metal as a good heat conductive material to dissipate heat away from the electrical components to the outside environment.

Conclusion


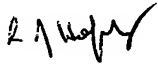
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert J. Hoffberg whose telephone number is (571) 272-2761. The examiner can normally be reached on 8:30 AM - 4:30 PM Mon - Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynn D. Feild can be reached on (571) 272-2092. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2835

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RJH



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